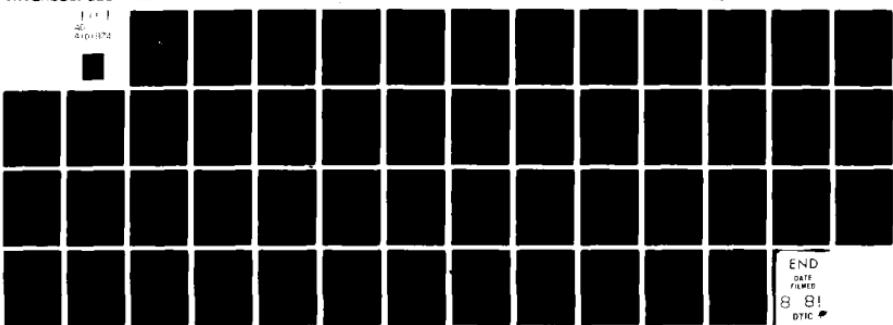


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COGNITIVE EVALUATION THEORY:  
AN EXPERIMENTAL TEST OF PROCESSES AND OUTCOMES.

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Cognitive evaluation

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**Abstract**

Cognitive Evaluation Theory has been proposed as a viable theoretical framework for explaining the detrimental effects of performance contingent rewards on intrinsically motivated behaviors. A review of the literature suggested that this theory had not been adequately tested. A field experiment was undertaken to do this. The results did not support the theory.

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Cognitive Evaluation Theory:

An Experimental Test of Processes and Outcomes

Reinforcement and cognitive motivational theorists (e.g., Hamner, 1974; Porter and Lawler, 1968) have emphasized the importance of establishing a clear linkage between desired responses and the receipt of valued outcomes, regardless of source, as a means of enhancing an individual's motivation. Challenges to this position, however, have recently begun to pervade the motivational literature (see Lepper and Greene [Eds.], The Hidden Costs of Reward, 1978 for an extensive review).

Deci (1975) has put forth a Cognitive Evaluation Theory (CET) suggesting that under certain conditions, performance contingent reward systems may have a detrimental effect on intrinsically motivated behavior. "Intrinsically motivated behaviors are those behaviors that are motivated by the underlying need for competence and self-determination" (Deci and Ryan, 1980, 42). Specifically, he posits the following:

Proposition I of Cognitive Evaluation Theory:

One process by which intrinsic motivation can be affected is a change in perceived locus of causality from internal to external. This will cause a decrease in intrinsic motivation, and will occur, under certain circumstances when someone receives extrinsic rewards for engaging in intrinsically motivated activities.

Proposition II: The second process by which intrinsic motivation can be affected is a change in feelings of competence and self-determination. If a person's feelings of competence and self-determination are diminished,

his intrinsic motivation will decrease.

Proposition III: Every reward (including feedback) has two aspects, a controlling aspect and an informational aspect, which provides the recipient with information about his competence and self-determination. The relative salience of the two aspects determines which process will be operative. If the controlling aspect is more salient, it will initiate the change in perceived locus of causality process. If the informational aspect is more salient, the change in feelings of competence and self-determination process will be initiated. (Deci, 1975, 139-143).

Deci also proposes that monetary rewards contingent upon task performance are more likely to activate the controlling aspect of the reward which, by changing the locus of causality from internal to external, leads to a reduction in intrinsic motivation. This is less likely to occur, he believes, for monetary outcomes that are not administered on a performance contingent basis. Further he suggests that organizations should pay to attract and insure the participation of people in organizational activities, but that they should rely upon such techniques as job enrichment and participative management to motivate performance by employees. These techniques should lead to enhanced feelings of competence and self-determination without an

accompanying move from an internal to an external belief about the locus of causality. Deci's propositions are presented schematically in Figure 1.

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Insert Figure 1 about here

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Deci's theory has stimulated much controversy (see Calder and Staw, 1975; Notz, 1975; Scott, 1976; Jones and Mawhinney, 1977; and Guzzo, 1979). Our review of previous studies suggests mixed support for the outcomes predicted by CET (see Table 1).

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Insert Table 1 about here

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Other reviewers of this literature have differed in the conclusions they have drawn. Notz (1975a) suggested that the evidence was unequivocal in demonstrating that under certain circumstances, intrinsic and extrinsic motivation have been found to be nonadditive, and that this interaction appears to be symmetrical; i.e., the addition of extrinsic rewards leads to a decrease in intrinsic motivation and the withdrawal of extrinsic rewards leads to an increase in intrinsic motivation. Jones and Mawhinney (1977) concluded that Deci's recommendations for the abandonment of contingent pay systems appears premature. Both sets of reviewers felt that the existing theory and evidence do not permit us to specify under what conditions extrinsic rewards will enhance or diminish intrinsic motivation. Guzzo (1979) reached the

Cognitive Evaluation

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conclusion that performance contingent reward systems would have detrimental effects on intrinsic motivation only when the extrinsic reward was 1) salient, 2) of sufficient magnitude to induce attributions of behavior causality, 3) not conducive to the expectation of future rewards for similar performances, and 4) not seen as a symbol of success. These restrictions, he suggests, are so severe that CET has no practical utility for understanding work rewards and motivation.

While we have rated 14 of the 24 studies reviewed as supportive of Deci, two caveats to this interpretation of the data must be noted. First, in many of the studies where both attitudinal and behavioral measures of intrinsic motivation were obtained, the effects were observed for only behavioral or attitudinal measures and not both. It is noteworthy that this is also true of Deci's original studies (1971, 1972a). Thus, the interpretation of a study as supportive of Deci's position rests on what variable the researcher or reviewer thinks best reflects the concept of intrinsic motivation. It also should be noted that various researchers have operationalized intrinsic motivation in different manners. For example, Deci and his colleagues (1971, 1972, 1972a, 1972b, 1975) and Lepper and his colleagues (1973, 1976) have operationalized it as free choice behavior; Arnold (1976), Calder and Staw (1975b), and Farr (1976) considered the subjects volunteer rate (self-report or actual); Farr and his colleagues (1976, 1977), Fisher (1978), Hamner and Foster (1975), Lepper, Greene, and Nisbett (1973), and Phillips and Lord (1980) included performance measures while still others have used

measures of task interest or satisfaction (Farr, 1976, 1977; Kruglanski, Alon and Lewis, 1972; Pinder, 1976).

A second caveat to be used in interpreting research on the subject is that none of the researchers attempted to validate the process exactly as hypothesized by Deci. The importance of examining the process is noted by Deci as the following statement shows:

We have suggested that the important factor in understanding the effects of extrinsic rewards or feedback on intrinsic motivation is the person's phenomenological evaluation of the reward (Deci, 1975).

Only the research by Farr (1976, 1977) and his colleagues, Fisher (1978), Lopez (1979), Phillips and Lord (1980), and Pinder (1976) attempted to obtain any measures concerning causal attributions, and none of these studies demonstrated a nonadditive effect.

Table 2 shows a  $2 \times 2$  matrix which crosses the hypothesized processes by the predicted outcomes yielding four possible conditions. Only in cells 1 and 3 can clear evidence be obtained to support or refute Deci's theory. While findings conforming to cell 2 might be interpreted as disconfirming the Deci model, we believe that cell 3 is more readily interpretable than cell 2 with respect to CET for two reasons: 1) CET is clearly a theory about a process. Specifically, that certain phenomenological cognitions precede behavior. 2) In cell 2, other nonmotivationally-based constraints may be operating to inhibit behavioral change.

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Insert Table 2 about here

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Referring back to Figure 1 and Table 2, it is apparent that proper investigation of Deci's theory would require that 1) measures of the aspect of rewards, locus of causality, feelings of competence and self-determination, and intrinsically motivated task behavior be obtained; and 2) that a methodology should be used that allows for the examination of the hypothesized underlying process as well as the predicted effects on behavior. No research was uncovered which did this. Farr and his colleagues (1976, 1977) obtained a measure of locus of causality by asking the subjects to attribute "how hard" and "how well" they worked to nine factors (intrinsic/extrinsic outcomes). In keeping with CET, a more appropriate measure would have asked the subjects which were the more important outcomes in their efforts. While these researchers did obtain a measure of intrinsically motivated task behavior (free choice), they did not measure either the salient aspect of rewards or feelings of competence and self-determination.

Fisher (1978) obtained a measure of the controlling aspects of rewards and feelings of competence and self-determination (paper and pencil measure of intrinsic motivation, Task Reaction Questionnaire), but neglected to measure either locus of causality or intrinsically motivated task behavior.

Lopez (1979) also measured the controlling aspects of rewards (after Fisher, 1978), and intrinsic motivation (Task Reaction Questionnaire). In addition, she measured perceived personal control over performance. However, it is unclear to us whether or not there is any conceptual distinction between these last two constructs. Recall that the second proposition of CET states that if "a person's feelings of competence and self-determination are enhanced, his intrinsic motivation will increase." Therefore, it is not surprising that Lopez found

that perceived personal control was strongly related to her paper and pencil measure of intrinsic motivation. Like Fisher (1978), Lopez (1979) neglected to obtain measures of either the locus of causality or intrinsically motivated task behavior.

Phillips and Lord (1980) recently attempted to test CET by manipulating payment contingency and competence information. In general, their results were not supportive of the theory. More importantly here, however, is the fact that the experimental manipulations did not significantly influence the processes assumed by CET (i.e., locus of causality and personal competence), thus negating a true test of the theory. In addition, the reward contingency manipulation did not influence the level of intrinsic motivation. It is likely that this was due to an inadequate design wherein a) all subjects in a "high" reward condition were given \$2.00 at the end of 4 trials and b) all subjects in a "low" reward condition were also rewarded with \$2.00 at the end of 4 trials, the only difference being that these subjects were given no normative data through which they could compare their performance and thereby, presumably, assess the contingency between performance and pay. At best, this design represents a weak contingency manipulation.

Pinder (1976) obtained a measure of locus of causality by having subjects indicate whether the money or the enjoyment of doing the task was the more important reason for doing the work. He also used a free choice measure of intrinsically motivated behavior. However, he did not measure either aspect of rewards or feelings of competence and self-determination.

Thus, we see that no previous researcher measured all of the variables necessary to adequately examine the processes hypothesized by CET. Without this knowledge, the interpretation of previous studies as supporting or refuting Deci's position should be regarded as more speculation than fact. Therefore, it seems that the following two hypotheses are central to the validity of CET and have not been tested.

Hypothesis 1:

External locus of causality will intervene between the controlling aspect of rewards and behavioral indicators of intrinsic motivation.

Hypothesis 2:

Feelings of competence and self-determination will intervene between the informational aspect of rewards and behavioral indicators of intrinsic motivation.

The purpose of this research was to examine the phenomenological processes as well as the outcomes hypothesized by CET under natural working conditions on tasks with known characteristics.

Method

Procedures and Subjects

Six groups of 12 subjects were recruited and hired through a temporary employment agency to work for 4 days, 4 hours per day at \$3.00 per hour for the City Assessor's office in a medium sized mid-western city. The experiment was conducted over a five-week period with each group working either a morning or afternoon shift. There is anecdotal evidence that the groups did not interact nor were they aware,

prior to the debriefing, that they were participating in an experiment (see Boal, 1980). Of those hired, only 64 filled out both the pre and post-experimental questionnaire and thus could be used for data analysis purposes. Thirty-nine of the subjects were 30 years of age and under, 7 were between 31 and 45 while 18 were 46 and over. There were 43 females, and 21 males, all but 4 of whom had completed high school. Eighteen had some college education and 27 were college graduates. All were Caucasian.

The subjects were randomly assigned to work on either a "complex" or "simple" task. They worked on these tasks for two days. At the end of the second day, they were asked to fill out a questionnaire titled "Job Design Survey for Employees Working in the Assessor's Office, City of \_\_\_\_\_." At the beginning of the third day, the group received one of three randomly assigned pay treatments. The three treatments consisted of informing the group that each member would: 1) receive an increase of 25¢/hour, effective immediately, because their performance had been so good during the first two days; 2) receive a cost-of-living wage increase of 25¢/hour that had been authorized for city employees, effective immediately; or 3) they were neither informed about nor received an increase. At the end of the fourth day of work, they were again asked to fill out the questionnaire.

#### Task Manipulation

The following is a description of the initial task manipulations utilized in this experiment. The manipulations were somewhat similar to those used by Umstot (1975) in his dissertation study on the effects of task redesign and goal setting. Two pilot studies were conducted which led to modifications in the tasks and provided support that the tasks were different. A brief description of the two tasks, labeled

simple and complex, follows.

Simple Task

The task consisted of calculating and transcribing data from a property rental record onto a coding form. The supervisor handed out and picked up the work as completed. Instructions for doing the task were provided both verbally and in writing. Subjects were furnished with a template to simplify the data search process. Because some of the data had to be computed, calculators were provided. Subjects were told that the city wanted to put the data on computer files as a back-up data source. All subjects were allowed a fifteen minute break at a time specified by the supervisor.

Complex Task

The task consisted of calculating and transcribing data from a property rental record onto a coding form. The subjects also were required to make decisions about whether the property they are coding should be reinspected or whether the property rental card should be recopied. (The subjects in the simple task condition did not make these decisions). In addition, the subjects were responsible for picking up and returning the records they were working on. They were required to indicate, on a map

on the wall, which records they currently had or had completed as well as keeping a personal record of their performance. Instructions for doing the task were provided both verbally and in writing. The subjects were not furnished with templates, but they were provided with calculators. They were told that the job was very important because the city was putting the information on its computer data base, and the computer records would serve as the basis for making tax assessments. The subjects were told that they could take a fifteen minute break at their own discretion (see Boal, 1980 for a complete description).

#### Measures

Instrument development. The following eight-step process was used in developing the instruments used in this experiment. First, based upon theoretical considerations, tentative items were developed to measure the following constructs: 1) perceived task characteristics; 2) items designed to measure the aspect of rewards, locus of causality, and feelings of competence and self-determination, and; 3) behavioral indicators of intrinsic motivation. Second, the responses from the pre and post-manipulation questionnaires ( $n = 117$ )<sup>1</sup> were separately factor analyzed using the subprogram FACTOR from the Statistical Package for the Social Sciences (Nie, et al., 1975). Third, both

eigenvalue patterns (i.e., pre and post) were examined to determine how many factors should be extracted initially for examination. Two criteria were considered in guiding the initial choice. They were: 1) the Kaiser or eigenvalue criterion (Kaiser, 1974) and 2) the Scree-test (Cattell, 1965).

Fourth, after choosing the number of factors to initially investigate, the factor matrix was obliquely rotated. An oblique versus an orthogonal rotation was chosen because it was believed that within each category the variables were conceptually related. The oblique rotation chosen was direct oblimin with a delta ( $\delta$ ) value = 0. Fifth, the resulting factor pattern loadings were examined for interpretability. In this regard, items were examined to see how many factors loaded significantly at ( $> .30$ ). Items that crossload significantly on more than one factor, or do not load significantly on any factor are difficult to interpret. Therefore, they were not considered as possible candidates for selection. Sixth, the stability of the rotated factor patterns were checked by calculating congruency coefficients between the factor patterns of pre and post-manipulation data. The congruency coefficients were calculated using a computer program written by Sims, based upon Harman (1960). In some cases where, *a priori*, the number of factors that would be extracted was thought to be known (e.g., task characteristics), confirmatory analysis was also done by a target matrix and the pre/post-rotated factor patterns. Seven, scales were constructed (based on the above analysis and *a priori* expectations about the nature

and number of variables being measured). The internal consistency of these scales was determined by computing coefficient alphas. Eight, the foregoing led the researchers to either accept the scales formed or to delete some item(s) from analysis and repeat the process until acceptable scales had been developed.

Task characteristics (DJCI). This variable was operationalized by summing and averaging the responses of 18 items measuring five task characteristic dimensions (variety, autonomy, identity, feedback, and significance). Initial items were taken primarily from the Job Characteristics Inventory (Sims, Szilagyi, and Keller, 1976) but items were also taken from the Job Diagnostic Survey (Hackman and Oldham, 1974) and the Yale Job Inventory (Hackman and Lawler, 1971). The congruency coefficients between the obliquely related factor patterns and internal reliabilities (coefficient  $\alpha$ ) for each subscale are given in Table 3. Sample items are given below. Respondents were asked to describe their jobs using either a five-point scale anchored by the phrases "very little" and "very much" (10 questions) or a five-point scale anchored by the phrases "minimum amount" and "maximum amount" (8 questions).

How much variety is there in your job?

How much are you left on your own to do your own work?

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Insert Table 3 about here

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Controlling aspect of rewards (DCAR). This variable was operationalized by summing and averaging the responses to two items. The respondents were asked to indicate the degree to which they agreed with each statement using a seven-point scale anchored by the phrases "disagree strongly" and "agree strongly". Both statements are thought to reflect the degree to which the subject feels compelled, i.e., externally controlled, to behave in certain ways. Below are the two statements.

The main reason for the pay in this organization is to get me to do what the supervisors and management want me to do.  
As a result of the pay I receive, I get a feeling of compulsion of having to meet my supervisor's expectation.

The congruency coefficient between the related factor patterns and the internal reliability (pre/post) of this scale are reported in Table 3.

Informational aspect of reward (DIAR). This variable was operationalized by summing and averaging the responses to eight items. The respondents were asked to indicate the degree to which they agreed with each statement using a seven-point scale anchored by the phrases "disagree strongly" and "agree strongly". Table 3 reports the congruency coefficient between the rotated factor patterns and internal reliability (pre/post) of this scale. Below are sample items.

Management pays me in such a way as to indicate how well they think I am doing.

Pay in this organization conveys a great deal of information about my level of performance.

The main emphasis placed on the administration of pay in this organization is to indicate how well employees are doing their job.

External locus of causality (DELC). This variable was operationalized by summing and averaging the responses to three items. The respondents were asked the degree to which they agreed with each statement using a seven-point scale anchored by the phrases "disagree strongly" and "agree strongly". The congruency coefficient between the rotated factor patterns and internal reliability of this scale is reported in Table 3. Below are the items that comprise this scale.

My main reason for doing the job is the money.

I stay until the end of the job because I want to get the money.

I do the job because I am being paid.

Feelings of competence and self-determination (DCSD). This variable was operationalized by summing and averaging the responses to five items. The respondents were asked to indicate, using a seven-point scale anchored by the phrases "disagree strongly" and "agree strongly", the degree to which they agreed with each statement. Table 3 reports the congruency coefficient between the rotated factor patterns and the internal reliability (pre/post) for this scale. Below are the items that comprise this scale.<sup>2</sup>

Doing my job well increases my feelings of self esteem.

I always work as hard as I can.

I try to do the job as well as I can.

I feel bad when I do my job poorly.

I feel a great sense of personal satisfaction when I  
do my job well.

First behavioral indicator of intrinsic motivation (DTDBK). The first behavioral indicator of intrinsic motivation was operationalized by having the supervisor covertly record, on the second and fourth days of the subject's employment, the number of minutes the subject was tardy to work and the number of minutes the subject took for break.<sup>3</sup> Factor analysis, using both oblique and varimax rotations, suggested that these two measures be combined and not examined separately. Thus, a linear combination of these two observations was made to form this scale. This measure is referred to as the tardiness-plus-break scale and is denoted as DTDBK in the analyses.

Second behavioral indicator of intrinsic motivation (DQUIT). The second behavioral indicator of intrinsic motivation was operationalized by having the supervisor covertly record on the second and fourth days the time the subject quit working. The difference between this time and the time officially designated as the end of the work day constitutes the second indicator. For example, if the subjects had been hired to work from 8:00 A.M. to 12:00 noon, then the difference between 12:00 o'clock and the time they quit (before or after) was used. If they quit at 11:55, the difference was minus 5; if they quit at 12:05, the

difference was plus 5. This measure is referred to as the time-quit-work scale and is denoted as DQUIT in the analysis.

#### Results

While pilot testing with different groups suggested that the tasks should be perceived as significantly different in terms of task variety, identity, autonomy, feedback, and significance, a manipulation check of the experimental group's perceptions indicated that the tasks were not perceived as different at the traditionally accepted level of  $p < .05$  though they were perceived as marginally different ( $F_{1,58} = 2.74 p < .104$ ) in the proper direction. We believe that individuals ought to respond to rewards in the same way if: 1) they were administered in the same manner, 2) the tasks are perceived to be similar, and 3) theory and/or prior research does not indicate individual differences will moderate the response. Our understanding of CET, as currently formulated, and the prior research suggested that the data should be collapsed across tasks before analyzing it. Therefore, the results reported are based on data collapsed across tasks.<sup>4</sup>

While we cannot prove that the pay manipulations took, we believe that they did for the following reasons: 1) Performance data, based upon the pilot tests, were given to half of the subjects (those assigned to the "complex" tasks). None of the subjects expressed to either the supervisor or the first author (during the debriefing) that they had felt undeserving of the raise. 2) The performance contingent pay group reacted differently to the pay raise than did the nonperformance contingent pay group.<sup>5</sup>

Since Deci's theory is concerned with the phenomenological changes in workers' responses brought about by performance contingent versus noncontingent pay systems, difference scores between pre and post-manipulation measures were utilized in the analysis.<sup>6</sup>

Hypothesis 1: External Locus of Causality as an Intervening Variable.

To test hypothesis 1, an overall multivariate analysis of variance (MANOVA) was performed on the dependent variables of: controlling aspect of rewards (DCAR); external locus of causality (DELC); and the two behavioral indicators (DTDBK and DQUIT). Since this was significant ( $F_{4,55} = 27.43 p < .001$ ), simple multivariate contrasts between the control group (no pay increase) and each pay treatment (contingent/noncontingent) were performed followed by univariate and stepdown ANOVA on each dependent variable.

The result of the simple multivariate contrast between the performance contingent pay increase group and the control group was not significant ( $F_{4,58} = 1.47 p < .23$ ), suggesting that performance contingent pay does not have the detrimental effects hypothesized by Deci.

Table 4 reports the results of the noncontingent/control group contrast. This was significant ( $F_{4,58} = 7.54 p < .001$ ). Examination of the univariate F's and column means (Table 5) suggests that the control group quit earlier on the fourth than they had on the second day while the noncontingent group worked longer, and the differences in these changes were significant ( $F_{1,61} = p < .001$ ). This suggests that noncontingent pay increases do not have detrimental effects on

intrinsically motivated behavior. However, the stepdown F's fail to reveal an explanatory role for either the controlling aspect of rewards or external locus of causality.

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Insert Tables 4 and 5 about here

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To further examine Deci's contentions about the relative effects of performance contingent versus noncontingent pay systems, simple multivariate contrasts, followed by univariate and stepdown F's, between the two pay conditions were calculated. The results (Table 6) indicated a significant difference between the two pay treatments ( $F_{4,55} = 16.49 p < .0001$ ). Those in the performance contingent condition quit earlier on the fourth day than they had on the second day while the opposite was true of the noncontingent group. This difference in change scores was significant ( $F_{1,58} = 64.66 p < .0001$ ). This lends support to Deci's warnings about the possible detrimental effects of performance contingent reward systems. It is interesting to note, however, that contrary to Deci, those in the performance contingent pay group saw the pay increase as less controlling while those who received the noncontingent pay raise saw it as more controlling. However, these relative changes in direction were nonsignificant ( $F_{1,58} = 3.38 p < .07$ ). Examination of the stepdown F's again, however, failed to support the process hypothesized by Deci.

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Insert Table 6 about here

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The conclusion drawn from these results is that hypothesis 1 is not supported.

Hypothesis 2: Feelings of Competence and Self-Determination as an Intervening Variable.

The procedure followed to test hypothesis 2 was the same as used in testing the first hypothesis except that the variables of interest were changes in: informational aspect of rewards (DIAR); feelings of competence and self-determination (DCSD), and the two behavioral indicators.

The overall multivariate F test was significant ( $F_{4,55} = 27.70 p < .000$ ), indicating the analysis should proceed.

The results of the simple multivariate contrast between the performance contingent pay group and the control group was not significant ( $F_{4,58} = 2.26 p < .07$ , Table 7). It is nonetheless interesting to note that examination of the univariate F's and the column means (Table 5) suggests that those who received the performance contingent pay increase perceived it as significantly more informational ( $F_{1,61} = 7.92 p < .007$ ). However, inspection of the stepdown F's reveals that this change did not account for a significant change in either feelings of competence and self-determination or in the behavioral indices of intrinsic motivation.

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Insert Table 7 about here

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The results of the contrast between the noncontingent pay increase group and the control group were significant ( $F_{4,58} = 8.23 p < .0001$ ,

Table 8). The multivariate effect can be attributed to the aforementioned change in quit behaviors ( $F_{1,61} = 29.01 p < .0001$ ). Again, examination of the stepdown F's fails to reveal an explanatory role for either the informational aspect of rewards and/or feelings of competence and self-determination.

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Insert Table 8 about here

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Table 9 shows the results of the simple multivariate contrast between the performance contingent pay increase group and the noncontingent pay increase group. The results were significant ( $F_{4,55} = 18.30 p < .0001$ ). Examination of the univariate F's and column means indicates that the multivariate effect is attributable to the relative changes in quit behaviors between the second and fourth days with the noncontingent group working longer. It is interesting to note that those who received the performance contingent pay increase saw this as relatively more informational than did those who received the noncontingent pay increase though this difference in change scores was not significant ( $F_{1,58} = 2.85 p < .10$ ). The stepdown F's, however, did not reveal that either the informational aspect of rewards or feelings of competence and self-determination could account for the relative changes in intrinsically motivated behavior.

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Insert Table 9 about here

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The conclusion drawn from these results is that hypothesis 2 is not supported.

Discussion

Evidence has begun to accumulate suggesting that performance contingent reward systems may have detrimental effects not explained by traditional theorizing. Deci (1975) suggested two phenomenological processes that might account for these effects. A review of the literature indicated that no complete test of these processes had been reported. In addition, only Lopez (1979) attempted to test Deci's ideas in a natural work setting, and she did not find support for CET. The purpose of this research was to examine the processes hypothesized by Deci in a natural working environment on tasks with known characteristics. While the results lend some support to Deci's contention that performance contingent reward systems may decrease intrinsically motivated behavior, they do not support either of the two hypothesized processes as explanatory frameworks.

The present study is superior to previous attempts to test CET in that all of the variables of interest were measured. It could be argued that the tasks performed were not sufficiently intrinsically motivating to constitute a fair test of CET. However, if correct, then this study points out at least two major limitations to CET. First, its industrial application may be severely limited as Guzzo (1979) contends. As yet there is no evidence that CET holds for any job with

known task characteristics. Second, CET was not shown to be a viable theoretical framework for explaining changes in intrinsically motivated behavior when individuals are paid for performing "simple" tasks. Again, this severely limits its practical usefulness for explaining motivation within the work setting.

We believe that the results of this experiment fall into cell 3 of the confirmation matrix, and thus do not support CET.<sup>7</sup> Some may note that of the two behavioral indicators of intrinsically motivated behavior, only consistent change differences were observed for the time-quit-working indicator. Thus, one could argue that the results of this experiment should be interpreted as falling in cell 4, as opposed to cell 3 of the CET confirmation matrix. However, as Lepper and Greene (1978) argue:

From an attributional perspective, inferences concerning an individual's subsequent intrinsic motivation can only be made when that person's behavior is observed in a situation in which further tangible or social rewards are not expected.

Clearly, of the two behavioral indicators used in testing CET in this research, the time-quit-working on the last day of employment best meets Lepper and Greene's requirement.<sup>8</sup>

The findings reported here provide no clear answer to the question as to when extrinsic rewards, whether performance based or not, will enhance or diminish intrinsically motivated behavior. There are several

paths that future researchers might explore. First, as noted above, there is a clear need to replicate these findings. It is suggested that Deci's original experiment be replicated, but that a methodology be employed to assess the process. Also, it is suggested that researchers obtain task characteristic information so that boundary conditions concerning additive/nonadditive effects may be delineated. Clearly, more research is needed in naturally occurring working environments.

A second direction for future research to take would be to investigate possible moderating variables. Farr, Vance, and McIntyre (1977) suggested that locus of control and the individual's self-esteem might moderate the effects of performance contingent pay systems. While that study did not find a moderating effect neither did it adequately operationalize all of the variables in Deci's theory nor did it attempt to model the process. These authors suggest that performance/social information, independent of the pay system, about the person's relative success/failure on the task may moderate the process. To illustrate, recall two events from the recent past. In the first, one of the winners of a motion picture academy award was remarking that he was one of the lucky ones inasmuch as he was paid to do what he liked. (Note that in this situation there was independent confirmation that he was a success => additive effect). Then remember Beth Heiden's performance in the Winter Olympics. Like her brother Eric, she was expected to win all the gold medals. She did not. At a press conference after the Olympics, she told the press she was sick and tired

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of skating for them and that it was no fun anymore. (Note that in this situation she had experienced relative failure => nonadditive effect). In this same vein, Kruglanski (1975) has suggested that an attributional analysis of the causes of one's behavior is more likely to be instigated when one is dissatisfied (versus being satisfied) with current outcomes.

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Footnotes

<sup>1</sup>A second experiment was run concurrently with this one. The responses from subjects in both experiments were used in developing the instruments prior to examining the hypotheses.

<sup>2</sup>The first, fourth, and fifth items of this scale were taken from the Experienced Work Motivation scale used in the Job Diagnostic Survey (Hackman & Oldham, 1974).

<sup>3</sup>The subjects were told they were allowed fifteen minutes.

<sup>4</sup>The data were analyzed separately by the first author. These results were essentially the same as those found when the data were collapsed.

<sup>5</sup>A scale had been developed to independently assess whether or not the pay manipulations took. Unfortunately, these items collapsed with the items developed to assess the informational aspect of reward.

<sup>6</sup>Examination of the premanipulation responses suggests that the results are not attributable to regression effects.

<sup>7</sup>It also should be noted that Phillips and Lord's (1980) data can be interpreted as finding that locus of control and sense of personal competence are not independent processes. This would, of course, cast doubt on the formulation of CET as a theory, regardless of the results reported here.

<sup>8</sup>A convenience sample of 60 coding sheets (30 before the pay manipulation and 30 after) from each group were examined by the supervisor for coding errors. Only the performance contingent pay group committed more errors after the treatment. They committed 8 more errors (36 → 44) while the noncontingent pay group committed 13 fewer errors (50 → 37), and the control group committed 31 fewer errors (87 → 56). These performance differences are consistent with CET predictions about behavioral outcomes.

Table 1

## Summary of Empirical Research

Study	Subjects	Task	Independent Variables	Dependent Variables	Support for CET
Arnold (1976)	College Students	Enterprise Pay vs. No Pay	Non-Contingent Pay vs. No Pay	Free Choice Behavior Attitude Questionnaire	No
Calder & Staw (1975b)	College Students	Jig-Saw Puzzle	Interesting/Dull Task; Contingent/ Non-Cont Pay	Attitude Questionnaire	Yes
Deci (1971)	College Students	Soma Puzzle	Cont/No Pay	Free Choice Behavior Attitude Questionnaire	Yes

Table 1 (Continued)

<b>Deci (1972a)</b>	<b>College</b>	<b>Soma Puzzle</b>	<b>Cont/No Pay</b>	<b>Free Choice Behavior</b>	<b>Yes</b>
<b>Students</b>					
<b>Deci (1972b)</b>	<b>College</b>	<b>Soma Puzzle</b>	<b>Non-Cont/No Pay</b>	<b>Free Choice Behavior</b>	<b>Yes (Null Affirmed)</b>
<b>Students</b>					
<b>Deci &amp; Cascio (1972)</b>	<b>College</b>	<b>Soma Puzzle</b>	<b>Noxious Stimulus</b>	<b>Free Choice Behavior</b>	<b>Yes</b>
<b>Students</b>					
<b>Deci, Cascio, &amp; Krussel (1975)</b>	<b>College</b>	<b>Soma Puzzle</b>	<b>Sex; Positive &amp; Negative Feedback</b>	<b>Free Choice Behavior</b>	<b>Yes (Negative Feedback)</b>
<b>Students</b>					
<b>Farr (1976)</b>	<b>College</b>	<b>Erector Set</b>	<b>Task; Cont vs. Non-Cont Pay</b>	<b>Performance Attitude Questionnaire (Attributions)</b>	<b>No</b>
<b>Students</b>					

Table 1 (Continued)

Farr, Vance, & College McIntyre Students (1978)	Soma Puzzle	Cont/Non-Cont Pay, Pay Magnitude, Locus of Control, Self-Esteem	Performance Free Choice Behavior (Attributions)
Fisher (1978)	Clerical Help (Female)	Hidden-Word Puzzle Control	Cont/Non-Cont Pay, Personal Behavior Performance Attitude Questionnaire
Hamner & Foster (1975)	College Students	Coding Scores	Interesting vs. Dull Task; No/ Non-Cont/Cont Pay
			Performance Attitude Questionnaire

Table 1 (Continued)

Kruglanski, Freedman, & Zeevi (1971)	High School Students	Creativity & Memory Task	Lab Tour/No Tour	Performance	Yes
Kruglanski, Aion, & Lewis (1972)	Elementary School Children	Competitive Games	Non-Cont Prizes/ No Prizes	Attitude Questionnaire	Yes
Lepper, Greene, Pre-School & Nisbett (1973)	Draw Pictures with Magic	W/Without	Free Choice	Behavior	
Lepper & Greene (1976)	Pre-School Children	Puzzles	W/Without Expected Reward;	Performance Surveillance/No Surveillance	Yes

Table 1 (Continued)

Lopez (1979)	Telephone Workers (Female)	Telephone Operator	Changes in Perceived Personal Questionnaire Control, Control-	Attitude No
			ling Aspect of Rewards, and Motivating Potential	
			Score of Job	
		Join ROTC	Draft Lottery	Attitude Yes
Notz (1975)	College Students		Number	Questionnaire
Pinder (1976)	Elementary School Children	Erector Set	Interesting/Non-interesting Task; behavior Attitude Cont/Noncont Pay	Free Choice Behavior Questionnaire
Phillips & Lord (1978)	College Students	Lunar Landing Module (Interactive, Computer controlled)	Information about Self Reports of Competence and Reward Contingencies	No Intrinsic Motivation Behavior Meaning of Intrinsic Motivation

Table 1 (Continued)

Pritchard,	College	Chess	Cont/Noncont.	Free Choice Be-	Yes
Campbell &	Students	Problems	Pay, Time	havior Attitude	
Campbell (1977)				Questionnaire	
Ross (1975)	Pre-School	Play Drum	Salience of	Free Choice Be-	Yes
	Children		Reward	havior	
Staw (1974)	College	Join ROTC	Draft Lottery	Attitude	
	Students		Number	Questionnaire	Yes
				Performance	
Staw, Calder	College	Jig-Saw	Norms for	Attitude	No
& Hess (1976)	Students	Puzzle	Payment,	Questionnaire	
			Pay/No Pay		
Turnage &	College	Sorting Task;	Interesting vs.	Free Choice Be-	No
Muchinsky	Students	Arthur Pencil	Dull Task;	havior Attitude	
(1976)		Point Task	Choice/No Choice	Questionnaire	
			of Reward; Cont/		
			Noncont. Pay		

Table 2

## Four Possible Conditions That May Occur

When Testing Deci's Cognitive Evaluation Theory<sup>a,b</sup>

		Predicted Change in Intrinsically Motivated Task Behavior	
		Occurred	Did Not Occur
Hypothesized Process	Occurred	1. Support for CET	2. Type of Disconfirmation, But Difficult to Interpret
	Did Not Occur	3. Clearest Disconfirmation of CET	4. No Interpretation

<sup>a</sup>To validate the theory, evidence for both the process and outcomes is necessary.

<sup>b</sup>After Deci (Personal Communication, 4/11/79)

Table 3

**Self-Report Measures of Perceived Task Characteristics,  
Controlling Aspect of Rewards, Informational Aspect of Rewards,  
External Locus of Causality, and Feelings of Competence and Self-Determination**

Variable	Number of Items	Coefficient $\alpha$		
		Pre-	Post-	Congruency
		Manipulation	Manipulation	Coefficients Pre/Post
Total	18	.81	.87	
Perceived Task Characteristics (DJCI)				
Subscales				
Variety	4	.80	.76	.94
Autonomy	5	.66	.77	.92
Identity	4	.79	.86	.94
Feedback	3	.67	.74	.91
Significance	2	.78	.89	.85

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Table 3 (Continued)

Controlling Aspect of Rewards (DCAR)	2	.51	.57	.64
Informational Aspect of Rewards (DIAR)	8	.88	.91	.99
External Locus of Causality (DELC)	3	.84	.87	.92
Feelings of Competence and Self-Determination (DCSD)	5	.68	.80	.94

Table 4

Simple Multivariate Contrast Between the Noncontingent Pay Increase Group  
and the Control Group (No Pay Increase) with Univariate and Stepdown F's

F-Ratio for Multivariate Test of Equality of Mean Vectors = 7.5426

D.F. = 4. and 58. P less than .0001

Variable	Hypothesis Mean Sq	Univariate F	P Less Than	Step Down F	P Less Than
1 DCAR	3.3092	1.2447	.2690	1.2447	.2690
2 DELC	.0288	.0371	.8480	.0237	.8783
3 DTDBK	131.5165	3.3540	.0720	3.4861	.0669
4 DQUIT	576.7842	29.0115	.0001	23.5544	.0001

Degrees of Freedom for Hypothesis = 1

Degrees of Freedom for Error = 61

Table 5

## Means of Change Scores

by Columns

	Performance	Noncontingent	Control
	Contingent Pay	Pay Increase	
	Increase		
DIAR	-.7116	.0396	-.018
DCAR	.6053	-.5652	-.0230
DSCD	.3684	.3913	.1545
DEL C	-.3153	-.2470	-.1964
DTDBK	-1.605	.2609	-3.159
DQUIT	-1.526	.4348	-6.727

Table 6

Simple Multivariate Contrast Between the Performance Contingent Pay Increase Group  
and the Noncontingent Pay Increase Group with Univariate and Stepdown F's

F-Ratio for Multivariate Test of Equality of Mean Vectors = 16.4933

D.F. = 4. and 55. P less than .0001

Variable	Hypothesis Mean Sq	Univariate F	P Less Than	Step Down F	P Less Than
1 DCAR	8.7531	3.3785	.0712	3.3785	.0712
2 DELC	.0022	.0028	.9582	.0106	.9183
3 DDBK	107.6478	2.6200	.1110	2.8196	.0987
4 DQTR	274.6909	64.6616	.0001	53.8144	.0001

Degrees of Freedom for Hypothesis = 1

Degrees of Freedom for Error = 58

Table 7

Simple Multivariate Contrast Between the Performance Contingent Pay Increase  
Treatment Groups and the Control Group (No Pay Increase) with Univariate and Stepdown F's

F-Ratio for Multivariate Test of Equality of Mean Vectors = 2.2570

D.F. = 4. and 58. P less than .0740

Variable	Hypothesis Mean Sq	Univariate F	P Less Than	Step Down F	P Less Than
1 DIAR	6.9816	7.9196	.0066	7.9196	.0066
2 DCSD	.1152	.1668	.6845	.6600	.4198
3 DTDBK	.5036	.0128	.9102	.0770	.7825
4 DQUIT	31.6975	1.5943	.2116	.6040	.4403

Degrees of Freedom for Hypothesis = 1

Degrees of Freedom for Error = 61

Table 8

Simple Multivariate Contrast Between the Noncontingent Pay Increase Group and the Control Group (No Pay Increase) with Univariate and Stepdown F's

F-Ratio for Multivariate Test of Equality of Mean Vectors = 8.23

D.F. = 4. and 58. P less than .0001

Variable	Hypothesis Mean Sq	Univariate F	P Less Than	Step Down F	P Less Than
1 DIAR	.0375	.0425	.8373	.0425	.8373
2 DCSD	.6303	.9125	.3433	.8580	.3581
3 DTDBK	131.5165	3.3540	.0720	3.4105	.0698
4 DQUIT	576.7842	29.0115	.0001	26.6860	.0001

Degrees of Freedom for Hypothesis = 1

Degrees of Freedom for Error = 61

Table 9

Simple Multivariate Contrast Between the Performance Contingent Pay Increase Group and the Noncontingent Pay Increase Group with Univariate and Stepdown F's

F-Ratio for Multivariate Test of Equality of Mean Vectors = 18.3005

D.F. = 4. and 55. P less than .0001

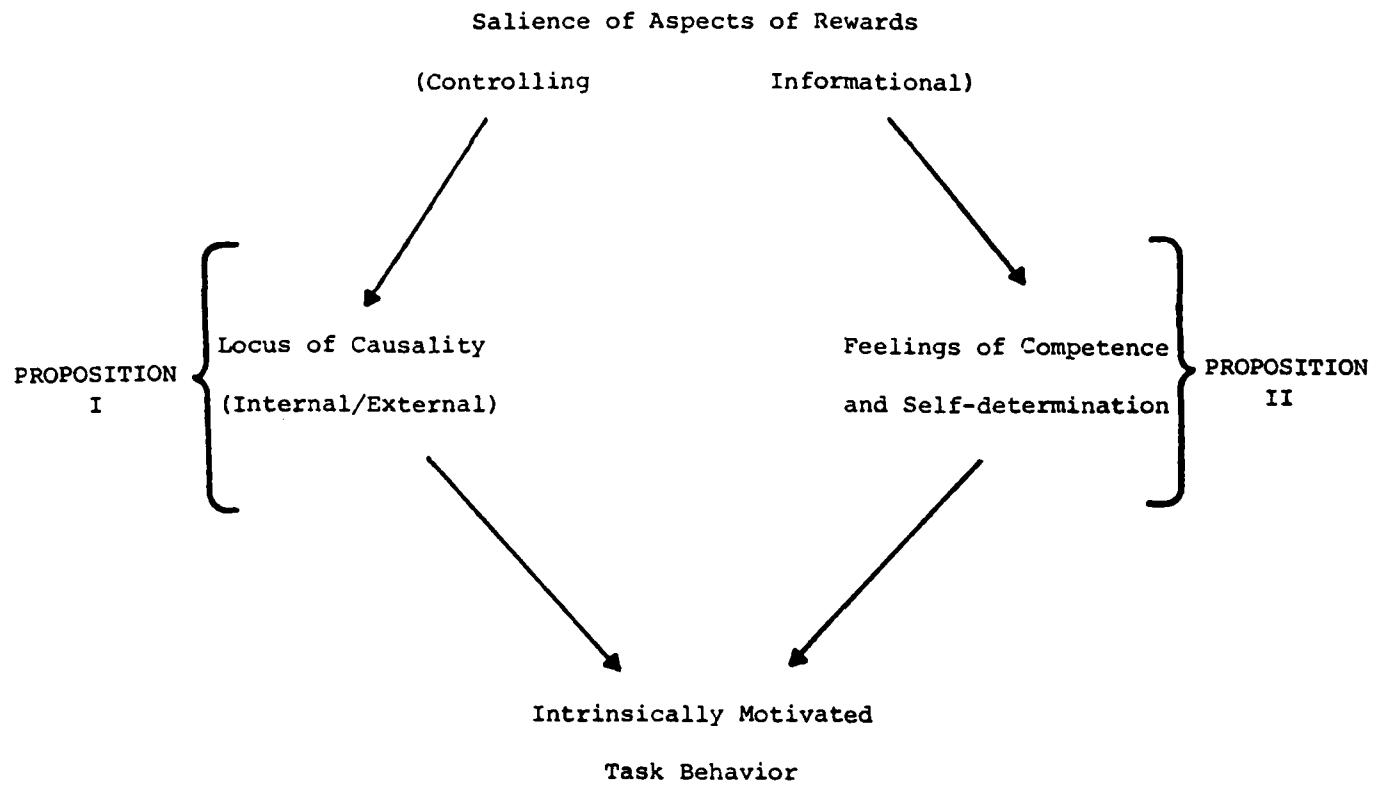
Variable	Hypothesis Mean Sq	Univariate F	P Less Than	Step Down F	P Less Than
1 DIAR	2.4991	2.8504	.0968	2.8504	.0968
2 DCSD	.3363	.4694	.4960	.1919	.6630
3 DTDBK	107.6478	2.6200	.1110	2.9375	.0921
4 DQUIT	274.6909	64.6616	.0001	60.7165	.0001

Degrees of Freedom for Hypothesis = 1

Degrees of Freedom for Error = 58

Figure Captions

Figure 1. A schematic of the propositions of cognitive evaluation theory.



After Deci (Personal Communication, 1979)